propionate and formiate, and subsequent treatment with sodium amalgam. The normal alcohol was converted into isopropyl alcohol by preparing from it the iodide, and from this the cyanide, which by treatment with potash yields propylamine. Propylamine hydrochloride on heating with argentic nitrate and water yields isopropyl alcohol, having the characteristic properties and reactions of this body.—Hugo Schiff follows "On the constitution of æsculin;" this is an important theoretical paper.—Quinke contributes the second part of his memoir, "On a new class of aromatic hydrocarbons." By the action of benzyl chloride on toluol, benzyl toluol $C_{14}H_{14}$ is formed with elimination of hydrochloric acid. By oxidation, this hydrocarbon yields benzylbenzoic acid $C_{14}H_{10}O_2$; this by the action of nascent hydrogen yields benzhydrylbenzoic acid $C_{14}H_{12}O_2$; and by the treatment with hydriodic acid the latter yields benzylbenzoic acid $C_{14}H_{12}O_2$.—Translations of two papers, which have already appeared in the French journals, and also a paper by Maly, complete this number.

THE *Journal of the Franklin Institute* for February, after the usual editorial paragraphs descriptive of novelties, has an article by Prof. H. B. Thurston, on Experimental Steam Boiler Explosions, containing a report of a series of experiments undertaken by a committee of the Institute, in conjunction with several railway engineers, for the purpose of testing the conditions under which steam boilers explode—Mr. F. A. Genth continues his paper on the Mineral Resources of North Carolina; and Mr. J. P. Cooke his Chemical Theory of the Voltaic Battery, the portion in the present number being devoted to Electricity.—Prof. P. E. Chase gives a Table of Cyclical Rainfalls at Lisbon, in support of the theory already advanced by him of the lunar influence on the weather. The other papers in this number are mostly of a purely mathematical character.

The first original article in the number for March is chiefly of local interest—"The Locomotive Engine, and Philadelphia's share in its Early Improvements," by J. Harrison, jun., the last recipient of the Rumford Gold Medal.—Mr. James Emerson gives a Report of Water-wheel Tests at Lowell and other places, illustrated with plates.—In another paper on Experimental Steam Boiler Explosions, Prof. Thurston discusses the third experiment at Sandy Hook, New York.—Mr. Joseph S. Smith describes the construction of the Keokak and Hamilton Bridge across the Mississippi, connecting the States of Iowa and Illinois.—Dr. Richard Owen, of the Indiana State University, details a series of experiments on Terrestrial Magnetism.—Prof. R. E. Chase gives tables of the Monthly Rainfall at San Francisco.

THE first article in the *American Journal of Science and Arts* for March is a most interesting account, by Prof. Hayden, of the Hot Springs and Geysers of the Yellowstone and Firehole rivers, accompanied by illustrations and maps. The description of these geysers, which throw those of Iceland completely into the shade, will not bear epitomising, but is well worth reading as a whole.—Two other geological articles are by Prof. Dana, on the Quartzite of the Green Mountains, and by Prof. Silliman, Geological and Mineralogical Notes on some of the mining districts of Utah territory.—Prof. A. E. Verril contributes two instalments of his contributions to zoology, from the Museum of Yale College, on the affinities of Palæozoic Tabulate Corals with existing species, and recent additions to the molluscan fauna of New England.—The other article of greatest interest is by Prof. H. A. Nicholson of Toronto, on the genera *Cornulites* and *Tentaculites*, and on a new genus *Conchicolites*.

THE *Quarterly Journal of Science* for April commences with an article by Mr. R. A. Proctor on Meteoric Astronomy. In reference to the researches of Signor Schiaparelli, he gives an account of the meteoric systems through which the earth passes in August and November, and seeks in meteoric phenomena and the associated phenomena of comets the explanation of some of the features presented by the solar corona. The zodiacal light he explains also on the theory of its being the outer portion of the sun-surrounding meteor families.—Mr. James Douglas, of Quebec, gives a description of the copper mines of Chili, and of the geological and mineralogical features of the country where they occur.—An article on Natural and Artificial Flight describes the results arrived at by Dr. Pettigrew in the case of the flight of birds and insects, and consists to a large extent of extracts from that gentleman's memoirs contributed to the Transactions of the Linnean Society and of the Royal Society of Edinburgh.—Mr. William Topley, in an article on the Geology of the Straits of Dover, illustrated by sections, advocates the project proposed by Hawkshaw and Low of a submarine tunnel, to run from near the South Foreland to a point between Sangatte and Calais, which he believes will pass entirely through the chalk, and will not be likely to be attended by any insuperable engineering difficulties.—An article on the Gold Coinage, and a short one by Captain Oliver on Recent Changes in British Artillery Material, complete the original portion of the number.—Only four books are reviewed this quarter, and more than half the space allotted to reviews is occupied by a notice, by Mr. A. R. Wallace, of Mr. Dale Owen's "The Debatable Land between this World and the Next," in which the reasonableness of the alleged phenomena of modern Spiritualism is advocated.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 25.—"On a supposed Periodicity in the Elements of Terrestrial Magnetism, with a period of 26⅓ days." By George Biddell Airy, Astronomer Royal, P.R.S.

In a paper published in the "Proceedings of the Imperial Academy of Sciences of Vienna," vol. lxiv., Dr. Karl Hernstein has exhibited the results of a series of observations which appeared to show that the earth's magnetism undergoes a periodical change in successive periods of 26⅓ days, which might with great plausibility be referred to the rotation of the sun.

It appeared to the author that the deductions from the magnetic observations made at the Royal Observatory of Greenwich, and which are printed annually in the "Greenwich Observations," or in the detached copies of "Results of Magnetical and Meteorological Observations made at the Royal Observatory of Greenwich," would afford good materials for testing the accuracy of this law, as applicable to a series of years.

The mean for declination in 1870, and, still more remarkably, the mean for horizontal force in 1870, appear to exhibit an increase about the fourteenth day. But the author does not remark in the other means, either as given in numerals or as projected as curves, anything to support the idea of an inequality periodical in the 26⅓ days. It might almost be suspected that the secular changes used in the period 1850-1852 are too large; but no alteration of these renders the inequality of 26⅓ days more probable. Dr. Hornstein's investigation was limited to observations made in 1870.

Royal Geographical Society, April 22.—General Sir Henry C. Rawlinson, K.C.B., president, in the chair. "On Recent Explorations of the North Polar Region, by Captain Sherard Osborn, R.N. Captain Osborn commenced by alluding to his advocacy of a Polar Expedition *via* Smith Sound, in 1865, and stated that the Duke of Somerset, then First Lord of the Admiralty, though apparently sufficiently favourable to the general proposal of a Government Expedition, urged upon him by a deputation from the Society who waited on him in that year, declined to assume the responsibility of recommending an expedition, owing to the difference of opinion which then reigned with regard to the best route to be followed. The alternate route to Smith Sound was that by the seas of Spitzbergen, advocated by Dr. Petermann and others, on the ground that the Gulf Stream, flowing in that direction, maintained an open sea to the Pole. He (Captain Osborn) and the promoters of the Expedition were content to wait the result of efforts made soon after by the Swedes and Germans to carry out the views of the German geographer. Seven years had elapsed, and we were now in a position to say that the advocates of the Spitzbergen route had been proved entirely wrong, whilst those who believed Smith Sound to be the best route were right. Captain Koldeway, who commanded both the German Expeditions, states, as the result of all his efforts, that "one can hardly resist the conviction that the hope of attaining the North Pole by ship, or of finding an open sea around the Pole, are alike among the most improbable of things. I confess that I myself was misled by representations in Dr. Petermann's 'Geographische Mittheilungen,' and held it to be at least possible by following a line of coast to penetrate by ship far into the central Arctic region, and then certainly to make one's way to the Pole. A winter in East Greenland, the most careful observation of these mighty masses of ice, their movements and formation, and of the whole condition of temperature, have radically cured me and all my companions of this idea. . . . If the principal object be the nearest possible approach to the Pole, I am quite of Osborn's opinion that the best way appears to be through Smith Sound. Here one can penetrate by ship every year to the 78th parallel, and then one has a continuous line of coast running north, which has been sighted as far as the 82nd parallel. Along this coast one would have to work one's way in spring with dog-sledges. I consider it a wild undertaking to penetrate towards the Pole by ship between Spitzbergen and Nova Zembla." No one could undo the effect of evidence so honest and conclusive as this. The Duke of Somerset rested his decision to delay action on the importance of first being furnished with the results of the Swedish Expedition, then on its way to Spitzbergen. The Swedes during the last seven or eight years had sent no less than four expeditions to the verge of the Polar region; and the conclusion of their scientific leader, Von Nordenskiöld, is that in summer it is not possible to penetrate by ship through the pack, and that an open Polar Sea is a mere hypothesis destitute of foundation. The Swedish authorities further state that the only way to approach the Pole is that proposed by the English Arctic officers, of exploring on sledges in the spring. Here, then, are the results for which the First Lord of the Admiralty in 1865 desired to wait. After a review of the voyage of the Austrian Lieutenants Payer and Weyprecht last summer, in which they found open sea a little to the north and west of Nova Zembla, and which discovery is to be followed up by a second expedition in the present summer, Capt. Osborn concluded by an eloquent appeal to the English people not to allow the final laurels of Polar discovery to be wrung from them by the sailors or explorers of any other nation. In the discussion which followed, Dr. J. D. Hooker spoke of the important questions in the science of botany which a North Polar Expedition alone could elucidate; such as the extension nearer the Pole of fossil plants like those of Disco in Greenland, which indicate a former temperate climate in 70° north. Dr. Carpenter advocated a Polar Expedition as a necessary complement to the one the Government were about to despatch to the Pacific to investigate the deep-sea ocean currents, and so forth. Accurate investigations of current-temperature, &c., of the Polar Ocean were of the highest importance to the right comprehension of the true theory of oceanic movements. Admiral Sir George Back stated that he entirely approved of the Smith Sound route as the one best to be adopted for a North Polar Expedition. Sir Leopold M'Clintock also spoke to similar effect. Admiral Richards explained the interest attaching to the completion of the geography of Greenland, which ought to be achieved by the English. He was strongly of opinion that a Government expedition, and by the English, was alone competent to finish the work of Arctic discovery. Mr. R. H. Scott read a letter from Von Nordenskiöld, in which he stated that a Swedish expedition would start for Spitzbergen this summer, winter in the islands to the north, and attempt a journey towards the Pole in May, 1873, with reindeer-sledges.

Anthropological Institute, April 8.—Sir John Lubbock, Bart., president, in the chair. Mr. Hyde Clarke read a note on the Hamath Inscriptions. The remainder of the evening was occupied by an exhibition and description, by Mr. Edward Charlesworth, of certain objects from the Crag of Suffolk simulating human workmanship. A long and animated discussion ensued, and the question was postponed until such time as Mr. Charlesworth could lay before the Institute, in the form of a paper, his matured opinion based upon reliable evidence.

April 22.—Dr. Charnock, vice-president, in the chair. Mr. Hyde Clarke contributed a further note on the Hamath Inscriptions and their comparison with Himyarite and Lybian.—A paper by Dr. Barnard Davis, F.R.S., was read "On the Hair and some other peculiarities of Oceanic Races." The paper was illustrated by a large and beautiful series of specimens of hair showing all the varieties of dressing, ornamentation, preparation, bleaching, &c., employed by a great number of races and tribes.—Dr. Henry Blanc also exhibited a specimen of long hair from the head of a Hindustanee.—A paper by Dr. Rink "On the Descent of the Esquimaux" was read, in which the author showed from traditionary and historical evidence that that race was truly American, and not Asiatic in its origin, as some ethnologists had maintained.—Dr. Charnock read a paper "On Le Sette Communi." The district lay nearly north of Vicenza. The people were the remnants of those Germans who obtained an asylum in that country after having been vanquished by Theodoric, King of the Ostrogoths, who died A.D. 526. There had been many marriages with the Italians, and the people more resembled the latter than the Germans. There were, however, many with fair hair and German features. The people were simple in their manners, honest, poor, dirty, and superstitious. The author noticed no cases of goître or cretinism. The paper concluded with a vocabulary and ample remarks on the grammar of the dialect, which resembled the Hochdeutsch of the 13th century, still spoken in Southern Bavaria. It had some words from the Italian.

Meteorological Society, April 17.—Dr. Tripe, president, in the chair. A paper was read "On the Temperature of Hill and Valley," by Mr. G. Dines. The observations in the valley were made at Cobham, and those on the hill at Denbies, the difference in height being about 600 feet; both the thermometer stands are those known as "Glaisher's," and the instruments are by Casella. The observations extend over eighteen months. The air on the hill is colder in the day and warmer at night than in the valley; and the daily range of temperature at the higher station is not so great as at the lower, the average being only about $4\frac{1}{2}$°. In cold weather it is found that the air on top of the hill is never so cold as that in the valley. The rainfall also on the hill is 40 per cent. greater than in the valley. It has been said that "the air on top of a hill is drier and colder than in the valley," but the results arrived at in this paper show that the contrary is the case. In the discussion which followed, Mr. Glaisher said that he had always found in his balloon ascents that the temperature decreased as he ascended, and was colder and more uniform the higher he went, but at night he found that the temperature was warmer than on the ground, and it was this that led him to place thermometers at the height of 4 ft., 22 ft., and 50 ft. above the ground, and the results obtained show that the air is sometimes 5° or 6° colder at 50 ft. than at 4 ft. in the day time, and 3° or 4° warmer at night time. Colonel Strange said that the temperature was colder on mountain tops both in day and night than in the valley. Dr. Mann thought that the temperature of the air directly above the earth in a balloon, and the temperature on top of a hill at the same height, would be quite different. The Rev. F. W. Stow had made several observations which showed that the air was warmer at the upper station and colder at the lower. Mr. Strachan remarked that unless the thermometers were protected from radiation the readings would be too high. Mr. Gaster said that solar radiation was out of the question, because the air is colder on top of the hill than in the valley when the sun is shining, and warmer at night when it is not shining, and he thought the more abrupt the hill the more would the observations coincide with those taken in a balloon at the same height.—The next paper was by Mr. C. O. F. Cator "On Certain Defects in Anemometric Registration." The author said that correct records cannot be obtained by the present method, that the sheets should be much longer, and made to move more quickly. A correct register of the velocity of the wind is not obtained because the cups cannot take up the motion directly at each gust, and in a lull the cups revolve too quickly on account of the momentum received from the previous gust. In registering the pressure of the wind, the sheets and the scale should be longer, because at present the very small amounts are scarcely shown, and in gales the paper is completely black from the constant movements of the pencil, but if the sheet were moved more quickly each separate pressure might be recorded.

PARIS

Academy of Sciences, April 22.—M. Camille Jordan read a note on the forms reduced from congruences of the second degree.—M. de Saint-Venant presented a paper on a complement to be given to one of the equations presented by M. Levy for plastic movements which are symmetrical around an axis.—A note was read by M. J. Montier on the internal work which accompanies the escape of a gas without variation of heat; and one by M. P. Desains on the reflection of heat at the surface of polished bodies.—Several notices more or less closely relating to auroras were read, namely, a note by M. Fron, presented by M. Delaunay, on the auroral period from the 10th to the 16th April, 1872, and its relations to the movements of the atmosphere; a portion of a letter from M. Donati to M. Delaunay, relating chiefly to phenomena of terrestrial magnetism observed during the time of manifestation of auroras; a claim of priority in proposing the theory of the solar origin of magnetic auroras, by M. H. Tarry; a continuation of M. J. Silbermann's paper on the relations existing between terrestrial meteorology and the movements of celestial bodies; and a note by M. Duponchel, in which that gentleman ascribes the origin of auroras to the modification of the calorific waves after sunset; as these then cease to traverse the atmosphere and become tangential with it, especially in the neighbourhood of the poles, he supposes them to produce there effects of light and perhaps of electricity.—M. Bellanger forwarded a note on the change which takes place in the boiling point of water when mixed with more volatile fluids.—M. Faye presented a note on the photographic studies of the sun which have recently been undertaken at the observatory of the Infante Don Luiz, at Lisbon.—A letter from Father Secchi on some peculiarities of the constitution of the sun was read; as also a note by M. W. de Fonvielle on the hypothesis of the magnetisation of the sun.—M. V. Raulin presented a note on the pluviometric observations made at Athens from 1859 to 1871, including tables of monthly mean rainfalls and other data.—A note by M. de Lafollye, on a mode of determining copper by means of cyanide of potassium, was read. This is a volumetric process performed by adding a standard solution of cyanide of potassium to a solution of a salt of copper coloured blue by ammonia, until the complete decolorisation of the latter.—M. E. Ferrière presented a note on the action of sulphuric ether upon iodides, in which he states that, by the addition of sulphuric ether to the solution of an iodide, the iodine is gradually entirely set free. He ascribes this action to the slow but continuous formation of an unstable hydriodic ether.—M. Wurtz communicated a note on the synthesis of orcine, by MM. G. Vogt and A. Henninger. This body was obtained by the authors by the action of potash in fusion upon the sulpho-conjugate acid of chlorinated toluene.—M. C. Robin presented a note by M. Rabuteau, on the physiological properties possessed by the various proximate principles of opium.—A note by M. Sanson, on the hybrids produced between the hare and the rabbit, was communicated by M. Milne-Edwards. The author stated that the production of fertile hybrids between these two species had certainly been effected in 1868 by M. E. Gayot, who had furnished him with individuals of the sixth generation, representing two varieties which have been established and called by the breeder the *Léporide ordinaire* and the *Léporide longue-soie*. The former is identical with the rabbit in its specific characters; the latter closely approaches the hare.—M. Milne-Edwards also presented a note by M. A. F. Marion on Rotatoria parasitic upon *Nebaliæ*. The author noticed the occurrence upon *Nebalia straussii* of a *Saccobdella* distinct from that observed by Van Beneden and Hesse on *N. geoffroyi*.—A note by M. H. Sicard on the respiratory apparatus of *Zonites algirus* was also presented by M. Milne-Edwards; as also a note on the termination of the vertebral column in the Pleuronectidæ by M. H. E. Sauvage.—M. de Quatrefages communicated a note by M. E. T. Hamy on the proportional development of the humerus and radius in man, in which the author noticed the relative lengths of these bones at various ages, and gave a table showing the gradual and very considerable diminution in the proportional length of the radius to the humerus on reaching the adult condition.—M. F. Garrigou presented a note on the unity of composition of the Pyrenees proper, and the chain commonly called the *Petites Pyrénées*. He maintained that no distinction can be drawn between them.—M. de Quatrefages communicated an extract from a letter by M. E. B. des Essards on sea shocks.

VIENNA

Imperial Academy of Sciences, March 7.—Prof. E. Hering, of Prague, transmitted a memoir by M. F. Hofmeister, containing investigations upon the connective tissue in the testes of the Mammalia.—Prof. V. Graber, of Graz, transmitted a preliminary report on the propulsory blood apparatus of insects, and on the occurrence of a true elastic fibrous net in the Hymenoptera.—Prof. L. Gegenbauer, of Krems, forwarded a memoir entitled "The Universalised Dirchlet's Integral;" and Dr. A. Boué delivered a discourse upon geological chronology.

March 14.—Prof. L. Gegenbauer transmitted a memoir on Definite Integrals.—Dr. F. Wallentin communicated a memoir on the Serial Development of Functions, and its employment in Algebraic Analysis, as well as in the Integration of Differential Equations.—A paper on the Destruction of the *nervus facialis* and its consequences, by M. Schauta, was presented by Prof. Brücke. The experiments were made on two young rabbits.—Prof. von Lang communicated a note by Prof. Handl, on the absolute intensity and absorption of light.—M. E. Priwoznik presented two communications, of which the first contained a chemical investigation of the coating formed upon an antique bronze implement found in an old Celtic grave, near Hallstatt; and the second the results of a series of experiments made upon the formation of the sulphides of copper, silver, tin, nickel, and iron, to which the former investigation gave rise. The crust which covered the bronze consisted of three layers, of which the outermost and thickest was formed of blue sulphide of copper; the second was blackish-gray, and composed of disulphide of copper with 15 per cent. of tin; and the third, or innermost, was formed of a black powder containing 23·2 per cent. of tin, together with the accidental constituents of the bronze, arsenic, antimony, and nickel.

BOOKS RECEIVED

ENGLISH.—Corals and Coral Islands: J. D. Dana (S. Low, Son, and Co.).—Introduction to Biology: H. Alleyne Nicholson (Blackwoods).—Natural Philosophy: E Atkinson (Longmans).—Mountaineering in the Sierra Nevada: C. King (S. Low. Son, and Co).—Lecture Notes to Chemical Students, Vol. ii., Organic Chemistry: E. Frankland. 2nd edition (Van Voorst).—The Principle and Practice of Canal and River Engineering: D. Stevenson. 2nd edition (A. and C. Black).

AMERICAN.—Gateways to the Pole: S. Bent (Studley, S. Louis).

DIARY

THURSDAY, MAY 2.

ROYAL SOCIETY, at 8.30.—On a new Great Theodolite (illustrated by the instrument) to be used on the Great Trigonometrical Survey of India, with a short Note on the Performance of a Zenith Sector employed on the same work: Col. Strange, F.R.S.—On some Elementary Principles in Animal Mechanics—V. and VI.: Rev. Prof. Haughton, F.R.S.

SOCIETY OF ANTIQUARIES, at 8.30.—Exhibition of Early Christian Rings: C. D. E. Fortnum, F.S.A.—Vortigern, not Hengest, the Invader of Kent: H. C. Coote, F.S.A.—Excavations of Tumuli at Trevalga: W. C. Borlase, F.S.A.

LINNEAN SOCIETY, at 8.—On *Alibertia edulis*: Señor Correa de Mello.

CHEMICAL SOCIETY, at 8.—On the Manufacture of Iron and Steel: E. Riley.

ROYAL INSTITUTION, at 3.—On Heat and Light: Prof. Tyndall, F.R.S.

FRIDAY, MAY 3.

ROYAL INSTITUTION, at 9.—On Optical Phenomena produced by Crystals when submitted to Circularly Polarised Light: W. Spottiswoode.

GEOLOGISTS' ASSOCIATION, at 8.—On Columnar Basalts: J. Curry.—On a Visit to the Diamond Fields of South Africa, with Notices of Geological Phenomena by the wayside: J. Paterson.

SATURDAY, MAY 4.

ROYAL INSTITUTION, at 3.—The Star-Depths: R. A. Proctor.

GOVERNMENT SCHOOL OF MINES, at 8.—On Geology: Dr. Cobbold, F.R.S.

MONDAY, MAY 6.

ENTOMOLOGICAL SOCIETY, at 8.—On the Longicorn Fauna of Nicaragua: H. W. Bates.

ANTHROPOLOGICAL INSTITUTE, at 8.—Peculiarities of the Australian Cranium: Mr. Bradley.—A Scaphoid Skull: Dr. Barnard Davis, F.R.S.—The Basque Race: Rev. W. Webster and Mr. Menteath.—Marm, its Names and their Origin: Mr. Jeffcott.—Queensland Dialects: Mrs. Barlow.—Preservation of Australian Dead: Mr. M'Donald.

ROYAL INSTITUTION, at 2.—General Monthly Meeting.

TUESDAY, MAY 7.

ZOOLOGICAL SOCIETY, at 9.—On Dinornis (Part XVIII.) containing a description of the pelvis and bones of the leg of *Dinornis gravis*: Prof. Owen, F.R.S.—Appendix to a List of Birds known to inhabit the Island of Celebes: Viscount Walden.—On the habits of the Swallows of the genus *Progne*, met with in the Argentine Republic, with notes by P. L. Sclater: W. H. Hudson.

SOCIETY OF BIBLICAL ARCHÆOLOGY, at 8.30.

ROYAL INSTITUTION, at 3.—On the Development of Belief and Custom amongst the Lower Races of Mankind: E. B. Tylor, F.R.S.

WEDNESDAY, MAY 8.

GEOLOGICAL SOCIETY, at 8.—Notes on Atolls or Lagoon Islands: S. J. Whitnell.—On the Glacial Phenomena of the Yorkshire Uplands: J. R. Dakyns.—On Modern Glacial Action in Canada: Rev. W. Bleasdell, M.A.—On a Sea-coast Section of Boulder Clay in Cheshire: D. Mackintosh.

SOCIETY OF ARTS, at 8.—On the Use of a Revolving Rabble in the common Puddling Furnace: F. A. Paget.

THURSDAY, MAY 9.

ROYAL INSTITUTION, at 3.—On Heat and Light: Prof. Tyndall, F.R.S.

SOCIETY OF ANTIQUARIES, at 8.30.

MATHEMATICAL SOCIETY, at 8.

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